9:30 – 9:35

Do Now: Find your last name and sit with your assigned groups. Introduce yourself. Complete the Group Contact Information Sheet

6th Grade	7th Grade	8th Grade
1. Fowler 2. Edwards 3. King 4. Nellums 5. T. Williams 6. Wyatt	1. Avinger 2. Bosco 3. J. Freeman 4. Fulmore 5. G. Williams	1. Roever 2. Fersner 3. Brunson 4. Harley 5. Hedgepeth

Algebra I	Algebra II
1. King 2. Bruton 3. Horlbeck 4. Perry 5. Sullivan 6. Yagatilee	1. Jefferson 2. Cooper 3. A. Freeman 4. Johnson 5. Ramsey 6. Seay

South Carolina
Department of Education

Implementing Mathematics Through Problem Solving in Algebra

Janel Johnson

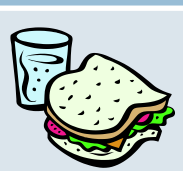
November 2013

9:35 – 9:40

Logistics

Questions

- Raise your hand and ask questions during the session.
- Parking Lot – questions not directly related to the session

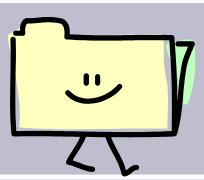


Breaks

- Morning Break and Afternoon Break (10 min each)
- Lunch (60 min)

Technology

- Feel free to take notes on your computer or tablet
- Cell phones on silent



Session Materials

- Will be posted on SCDE website and Edmodo Group

Photos: microsoft.com

Accessing Materials

- At the end of this session, all materials will be uploaded to the SCDE website (www.ed.sc.gov).
  - Take the following steps ***OR***
    - Hover over "Programs & Services"
    - Click on "Common Core Standards"
    - Click on "Support Resources for Math"
    - Click on "Archived Training Events Related to Implementation of CCSSM"
  - http://tinyurl.com/SCDEArchivedMathPD

www.ed.sc.gov


http://ed.sc.gov/
South Carolina Dep...
File Edit View Favorites Tools Help
South Carolina Departme... Gifted and Talented Advanced Placement Google Suggested Sites Web Slice Gallery IT Support SCDE Login
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Search ed.sc.gov
Go
I'm Looking For?
Agency
Programs & Services
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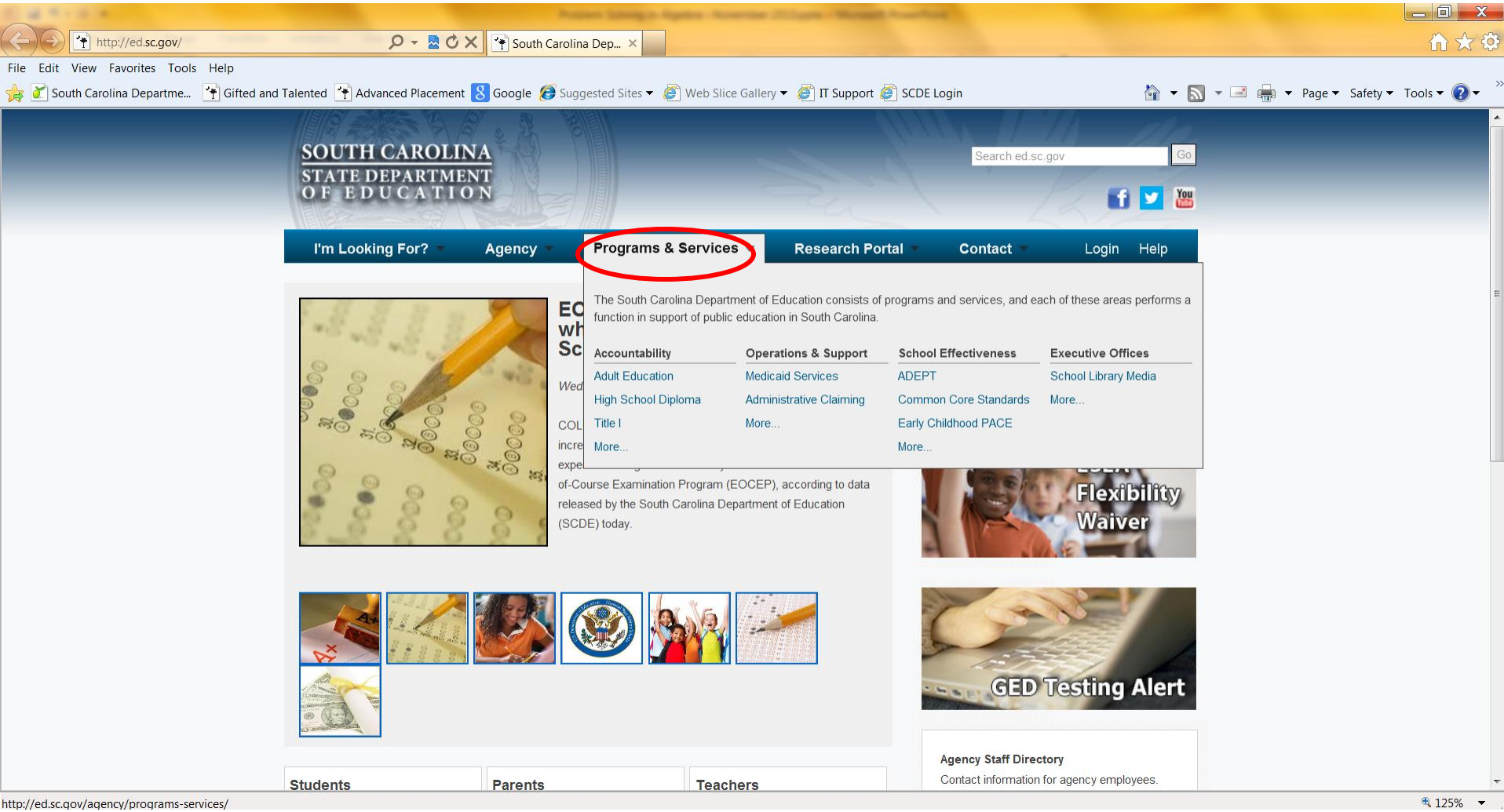
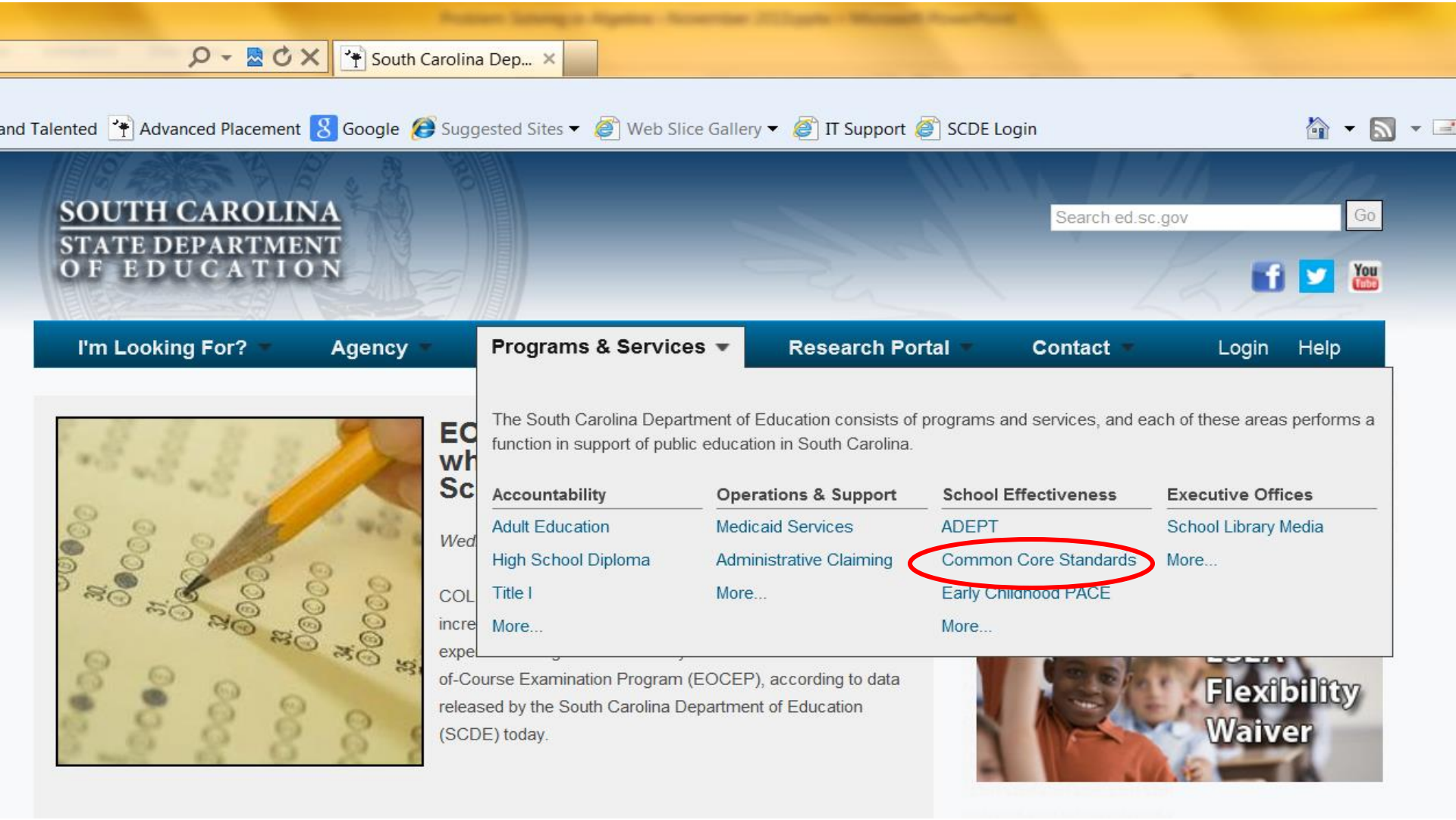
Login
Help
EOCEP Passage Rates Rise while English and Algebra Scores Decline
Wednesday, October 2, 2013
COLUMBIA – Passage rates for all subject areas experienced increases while the average scores for English and Algebra experienced slight declines this year on South Carolina's End-of-Course Examination Program (EOCEP), according to data released by the South Carolina Department of Education (SCDE) today.
SUPERINTENDENT OF EDUCATION
SCHOOL DIRECTORY
ESEA Flexibility Waiver
GED Testing Alert
Agency Staff Directory
Contact information for agency employees.
Students
Parents
Teachers
125%

Hover over "Programs & Services"



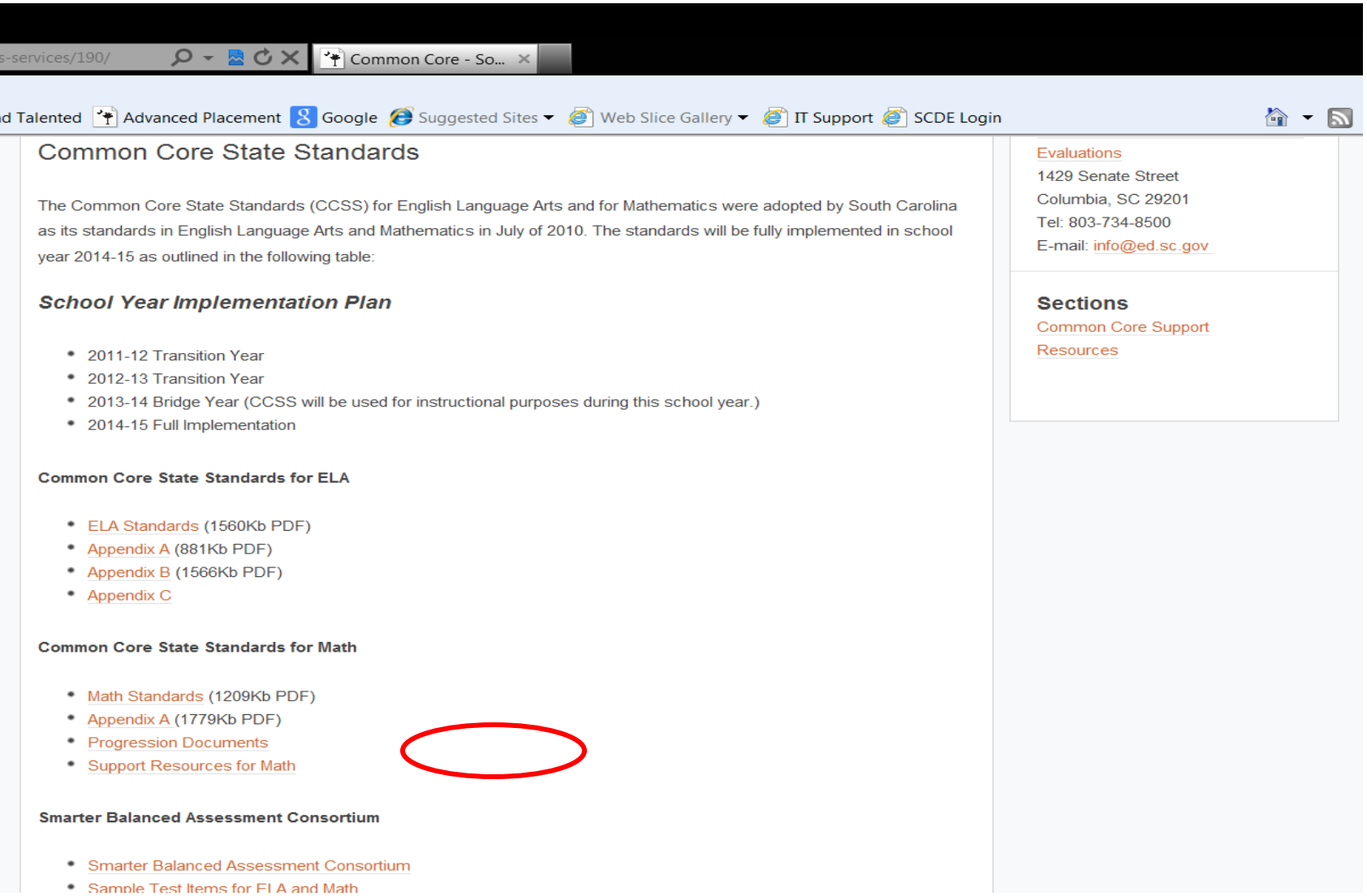
South Carolina Department of Education

Click on "Common Core Standards"



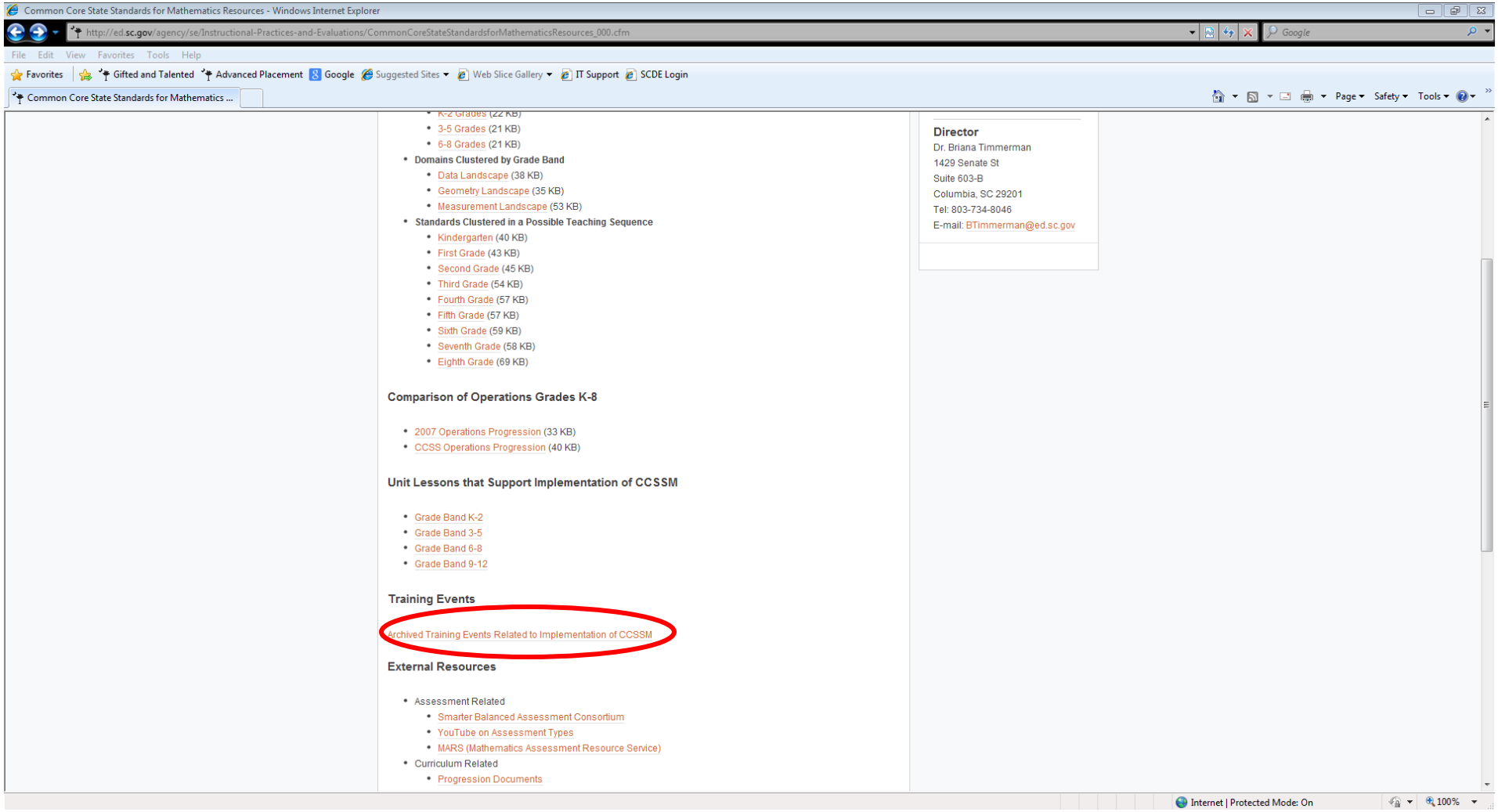
South Carolina Department of Education

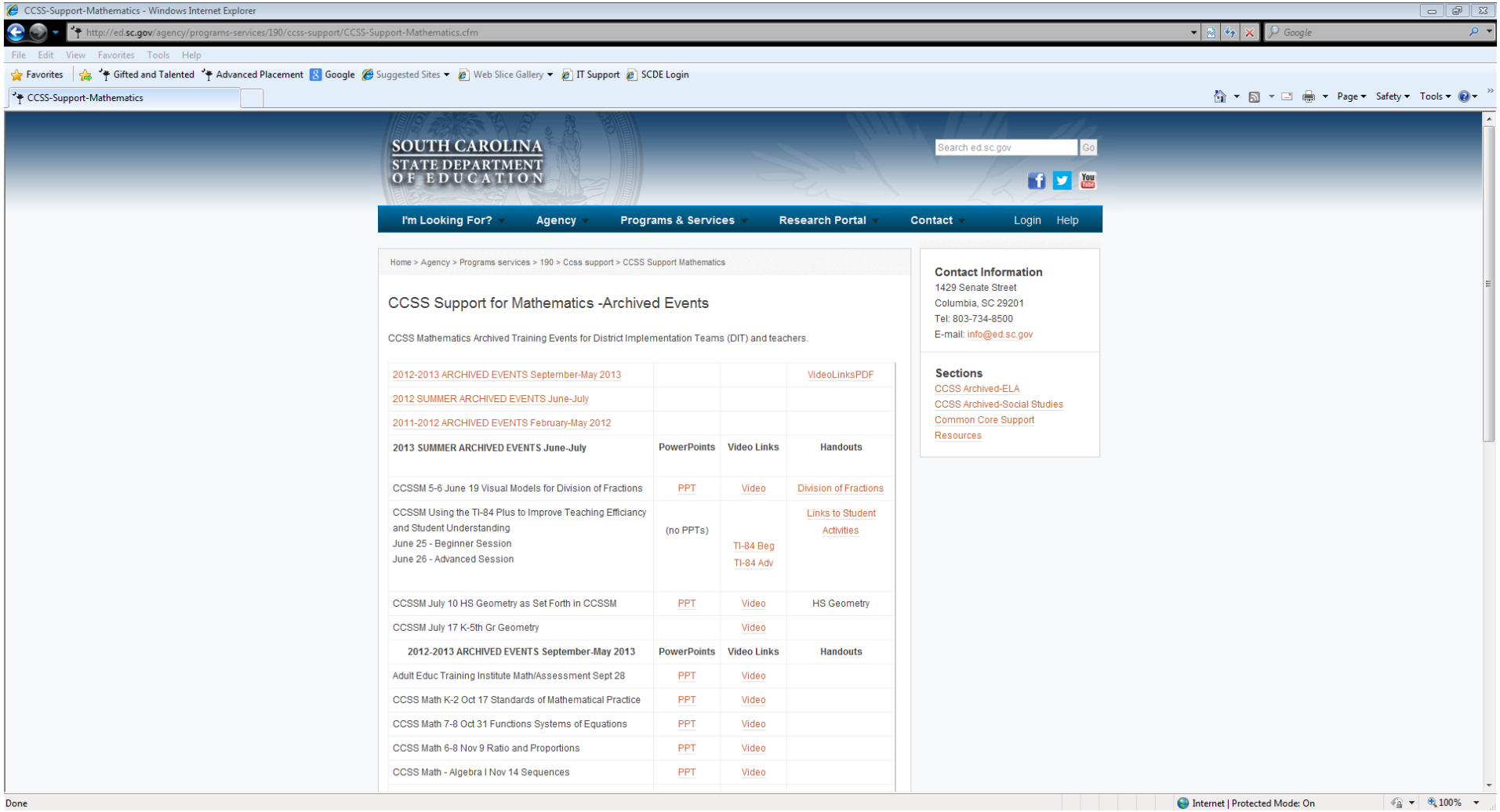
Click on "Support Resources for Math"



South Carolina Department of Education

Click on "Archived Training Events Related to the Implementation of CCSSM"




CCSS-Support-Mathematics - Windows Internet Explorer
http://ed.sc.gov/agency/programs-services/190/ccss-support/CCSS-Support-Mathematics.cfm
SOUTH CAROLINA
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OF EDUCATION
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Agency
Programs & Services
Research Portal
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Login
Help
Home > Agency > Programs services > 190 > Ccss support > CCSS Support Mathematics
CCSS Support for Mathematics -Archived Events
CCSS Mathematics Archived Training Events for District Implementation Teams (DIT) and teachers.
2012-2013 ARCHIVED EVENTS September-May 2013
VideoLinksPDF
2012 SUMMER ARCHIVED EVENTS June-July
2011-2012 ARCHIVED EVENTS February-May 2012
2013 SUMMER ARCHIVED EVENTS June-July
PowerPoints
Video Links
Handouts
CCSSM 5-6 June 19 Visual Models for Division of Fractions
PPT
Video
Division of Fractions
CCSSM Using the TI-84 Plus to Improve Teaching Efficiancy and Student Understanding
June 25 - Beginner Session
June 26 - Advanced Session
(no PPTs)
TI-84 Beg
TI-84 Adv
Links to Student Activities
CCSSM July 10 HS Geometry as Set Forth in CCSSM
PPT
Video
HS Geometry
CCSSM July 17 K-5th Gr Geometry
Video
2012-2013 ARCHIVED EVENTS September-May 2013
PowerPoints
Video Links
Handouts
Adult Educ Training Institute Math/Assessment Sept 28
PPT
Video
CCSS Math K-2 Oct 17 Standards of Mathematical Practice
PPT
Video
CCSS Math 7-8 Oct 31 Functions Systems of Equations
PPT
Video
CCSS Math 6-8 Nov 9 Ratio and Proportions
PPT
Video
CCSS Math - Algebra I Nov 14 Sequences
PPT
Video
Contact Information
1429 Senate Street
Columbia, SC 29201
Tel: 803-734-8500
E-mail: info@ed.sc.gov
Sections
CCSS Archived-ELA
CCSS Archived-Social Studies
Common Core Support Resources
Done
Internet | Protected Mode: On
100%

Accessing Materials

- At the end of this session, all materials will be uploaded to the SCDE website (www.ed.sc.gov).
- Join my Edmodo group (www.edmodo.com)
  - Login or create an account as a "Teacher"
  - Find the grey box under your name on the left with the word "Groups" and a plus sign.
  - Click on the plus sign, and select "Join"
  - Enter the group code: **z3t6cd**

9:40 – 9:45

Norms

- Listen as an Ally
- Value Differences
- Maintain Professionalism
- Actively Participate

Agenda

Time	Topic
9:45 – 10:15 a.m.	Why Algebra?
10:15 – 10:55 a.m.	Vertical Alignment – Part 1
10:55 – 11:05 a.m.	BREAK
11:05 – 11:45 a.m.	Vertical Alignment – Part 2
11:45 a.m. – 1:00 p.m.	LUNCH
1:00 – 1:22 p.m.	Problem Solving
1:22 p.m. – 1:45 p.m.	Mathematic Tasks – Part 1
1:45 p.m. – 1:55 p.m.	BREAK
1:55 – 3:10 p.m.	Mathematic Tasks – Part 2

Objectives

- **IDENTIFY** the algebra standards in a specified grade level
- **DETERMINE** the vertical alignment of a set of standards
- **OBSERVE** and analyze a lesson
- **DEFINE** the key features in a good mathematics task
- **CREATE** a task that is complete and ready to use

Implementing Mathematics Through Problem Solving in Algebra

WHY ALGEBRA?

Mathematical Shifts

Focus

Focus strongly where the standards focus

✓ *Algebra*

Coherence

Think across grades, and link to major topics

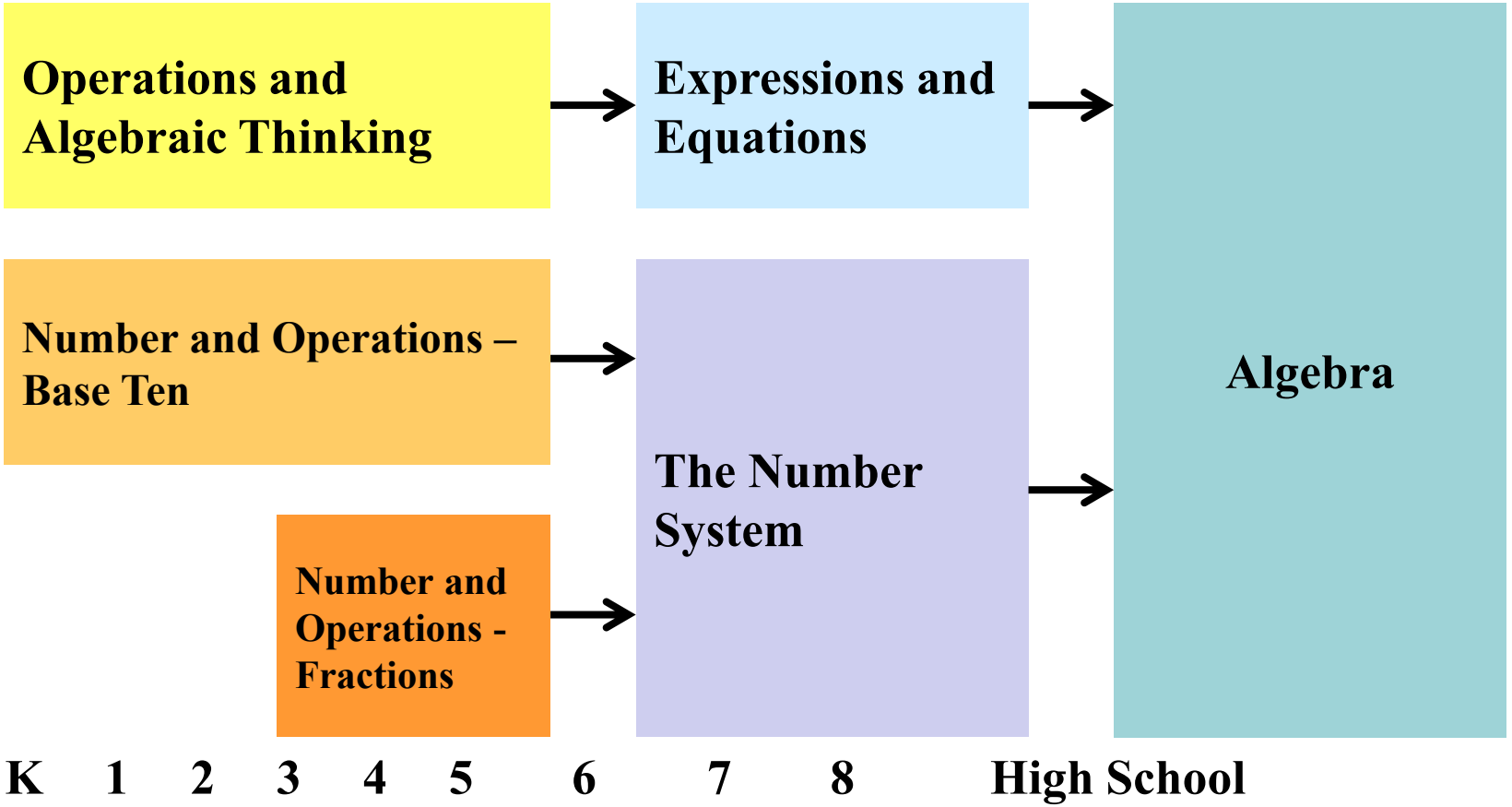
✓ *Vertical Alignment*

Rigor

In major topics, pursue conceptual understanding, procedural skill and fluency, and application

✓ *Application*

Why Algebra?


Operations and Algebraic Thinking
Expressions and Equations
Number and Operations – Base Ten
The Number System
Number and Operations - Fractions
Algebra
K 1 2 3 4 5 6 7 8 High School

Key Areas of Focus in Mathematics

6th Grade	7th Grade	8th Grade
Ratios and proportional reasoning; early expressions and equations	Ratios and proportional reasoning; arithmetic of rational numbers	Linear algebra and linear functions
9th – 12th Grade		
Number and Quantity (complex number systems), Algebra (with exponential integer inputs, Functions (quadratic), Geometry (proofs) and Statistics & Probability.		

Algebra Defined

Algebra is a branch of mathematics in which symbols, usually letters of the alphabet, represent numbers or members of a specified set. The symbols are used to represent quantities and to express general relationships that hold for all members of the set.

Algebra Standards

- Place an **asterisk (*)** beside the standards align to algebra content.
- **Highlight** key words that show level of thinking.
- **Circle** key words that show progression of skills/knowledge

ACTIVITY

Implementing Mathematics Through Problem Solving in Algebra

VERTICAL ALIGNMENT

What is Vertical Alignment?

Photo: upcyclededucation.com

What is Vertical Alignment?

Vertical alignment helps to determine what students should know ***before*** coming to a grade level and what students will be expected to know as they leave that grade level and ***advance*** to the next level.

Math Educators should consider how concepts are developed throughout the career of a student, and how math content builds from grade level to grade level.

Types of Relationships

- Knowledge or skills **BROADENED** to wider range of content
  - Same skills applied to wider content
- **DEEPER** understanding (cognitive processes) for the same content
  - Watch the verbs (recognize => explain)
- **NEW** (or different) content and/or skills
  - No matching standard in the previous grade
- Content is the **SAME** as in the standard at the previous grade level

Vertical Alignment Worksheet

What standard(s) from the previous grade level connect to this standard? What type of relationship exists between the previous grade level standard your grade level?	List the algebra standards for your assigned grade level.	What standard(s) in the next grade level connect to this standard? What type of relationship exists between the next grade level standard your grade level?

10:55 – 11:05

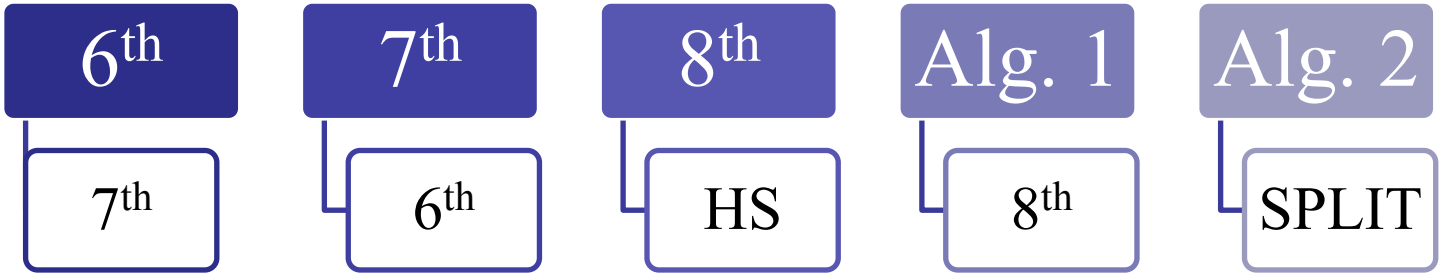
BREAK – 10 minutes

Photo: java-demos.blogspot.com

Collaboration – Round 1

In your groups, share out the standards and connections you listed on your **Vertical Alignment Worksheet**.

- Note any "ahas"
- Note any suggested changes.



Collaboration – Round 2

In your groups, share out the standards and connections you listed on your **Vertical Alignment Worksheet**.

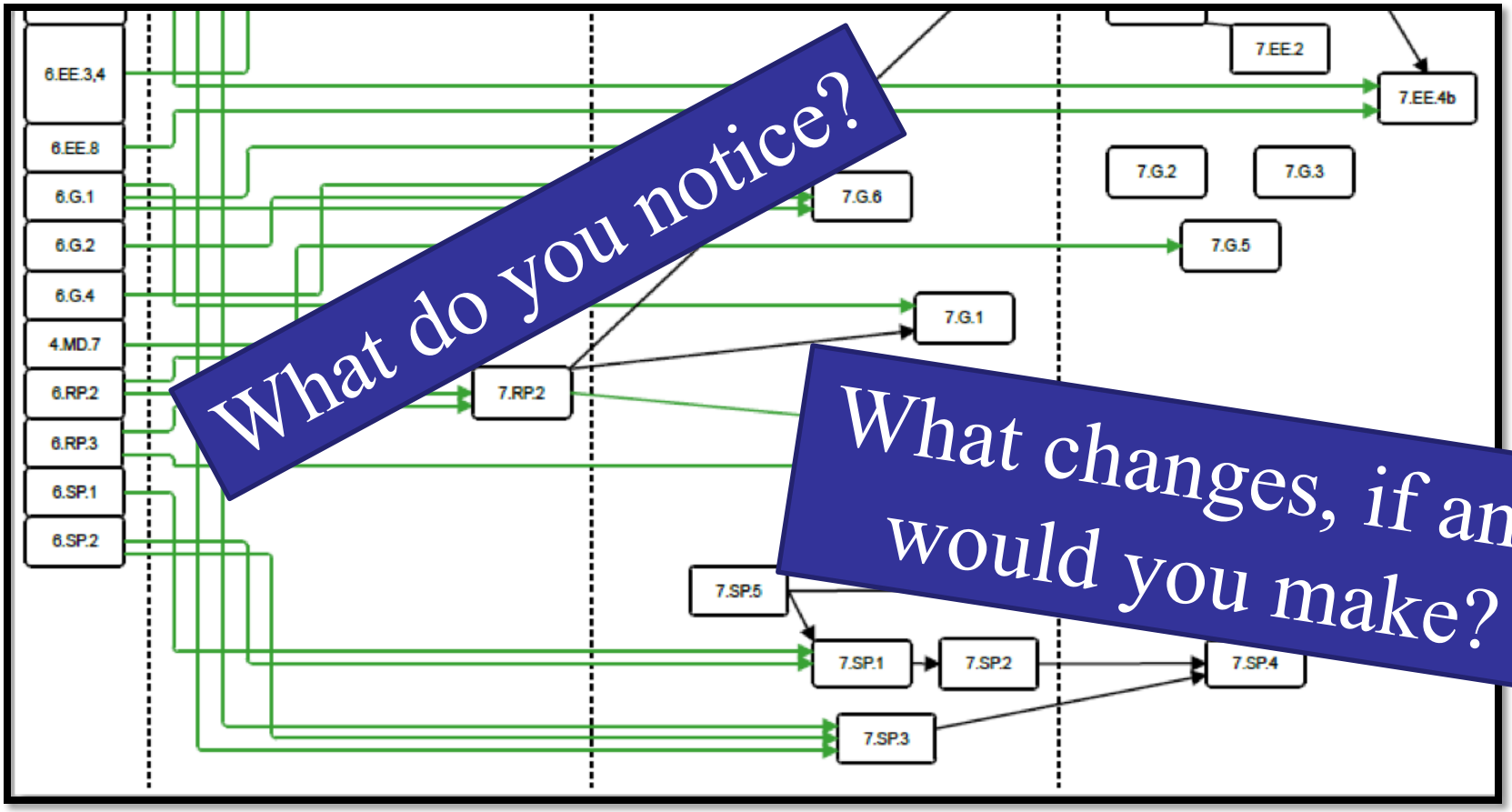
- Note any "ahas"
- Note any suggested changes.

6th	7th	8th	Alg. 1	Alg. 2
SPLIT	8th	7th	Alg. 2	Alg. 1

11:35 – 11:40

Photo: upcyclededucation.com

Wiring Graph



Developed by Jason Zimba, Bill and Melinda Gates Foundation

Benefits of Vertical Alignment

- ✓ Decreases the amount of instructional time consumed with re-teaching concepts
- ✓ Increases instructional time for the "major work" of each grade level
- ✓ Improves student performance

11:45 – 1:00

Lunch – 60 minutes

Photo: 123rf.com

Implementing Mathematics Through Problem Solving in Algebra

PROBLEM SOLVING

What is Problem Solving?

"Problem solving means engaging in a task for which the solution method is not known in advance."

-Principles and Standards for School Mathematics

It encompasses:

- ✓exploring
- ✓reasoning
- ✓strategizing
- ✓estimating
- ✓conjecturing
- ✓testing
- ✓explaining
- ✓proving

Observe and Analyze a Lesson

1. How did the teacher organize the lesson? What phases did it go through?
2. What resources did the teacher have available, and when were these used?
3. How did the teacher introduce the problem to students?
4. What different approaches did students use?
5. How did the teacher support the students that were struggling?
6. How did the teacher encourage the sharing of approaches and strategies?

Observe and Analyze a Lesson

Photo: Mathematics Assessment Project (MAP)

Observe and Analyze a Lesson

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4. What different approaches did students use?
5. How did the teacher support the students that were struggling?
6. How did the teacher encourage the sharing of approaches and strategies?

Benefits of Problem Solving

Students…

- ✓ learn to apply the mathematics as they are learning it.
- ✓ make connections within mathematics and to other content areas.

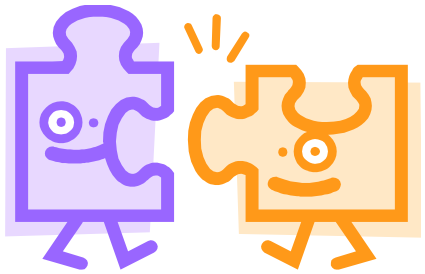


Photo: microsoft.com

Implementing Mathematics Through Problem Solving in Algebra

MATHEMATICAL TASKS

Mathematical Tasks

"If we want students to develop the capacity to think, reason, and problem solve then we need to start with high-level, cognitively complex tasks."

-Stein & Lane, 1996

Photo: upcyclededucation.com

Features of a Good Task

- It begins where the students are; accessible to wide range of learners.
- It is seen as something to make sense of.
- It requires justifications and explanations for answers and methods.
- The focus is on making sense of the mathematics involved and thereby increasing understanding.

John Van de Walle, Elementary & Middle School Mathematics, Teaching Developmentally
NRICH Project @ University of Cambridge, Nrich.maths.org/5662

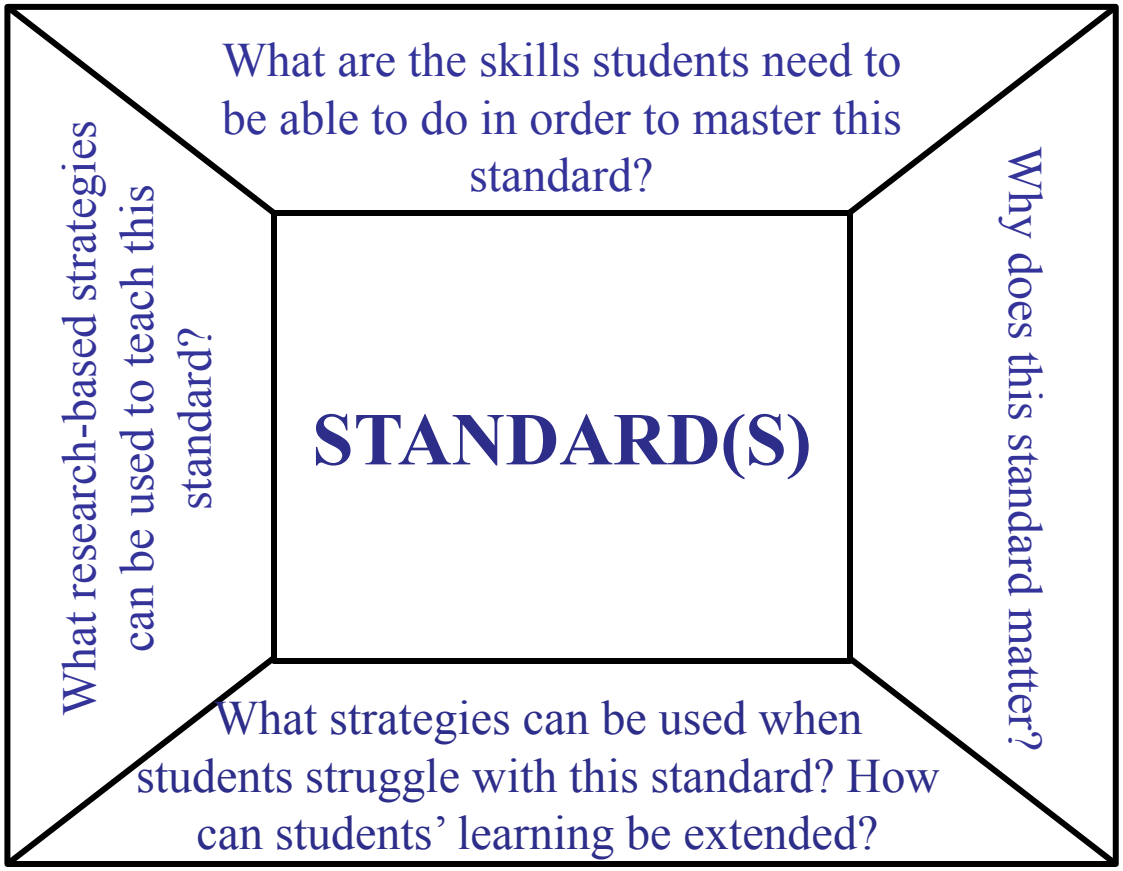
Features of a Good Task

- It challenges the learners to think for themselves.
- It offers different levels of challenge.
- It encourages collaboration and discussion.
- It has the potential for revealing patterns or leading to generalizations.
- It invites students to make decisions.

John Van de Walle, Elementary & Middle School Mathematics, Teaching Developmentally
NRICH Project @ University of Cambridge, Nrich.maths.org/5662

Placemat Collaborative

- In your groups, pick 1-2 algebra standards.
- Write the standard(s) in the center.
- Write in the space with the question in front of you.
- Rotate every 30 seconds.



1:45 – 1:55

BREAK – 10 minutes

Photo: java-demos.blogspot.com

1:55 – 2:00

Math Task Example

Mathematics: Expressions and Equations

7.EE.1	**Cluster Heading:** Use properties of operations to generate equivalent expressions. **Content Standard:** Apply properties of operations as strategies to add, subtract, factor & expand linear expressions with rational coefficients. **Standards for Mathematical Practice:** **MP6** Attend to precision, **MP3** Construct viable arguments and critique the reasoning of others.

Problem/Task Suggestions	Formative Assessment Suggestions
Make It True Fill in the blanks below to make the equation true for every value of *x*. Explain the steps you took, as well as any math properties you used. Compare your answer with a student with a different answer. Explain your reasoning and see if either of you can find a mistake or find common ground. $\_\_\_\_\_(2x+2)-4=10x+\_\_\_\_\_$ **Differentiation** **Support** • Start with review of distribution problems as a warm up. Review equivalent expressions and equality. • Fill in one of the blanks with a number and ask the student only to find out the other missing blank. **Extensions** • Come up with five other possibilities that will also make this a true statement for any value of *x*. • Substitute multiple values for *x* and decide if each yields a true statement. **Solutions:** Infinite number of correct solutions, e.g., • $5(2x+2)-4=10x+6$ • $2(2x+2)-4=10x+-6x$ • $8x+(2x+2)-4=10+-2$ • $3(2x+2)-4=10x-4x+2$ • $0(2x+2)-4=10x+-10x-4$	**Observation of Students** • Is the student able to recognize what the problem is asking? **MP1** • Is the student able to use mental math to do simple computations or does he or she need to use another tool? **MP5** • Does the student recognize that different answers are possible? • Can the student explain the process to other students? **MP6** • Does the student generate a true equation? • Does the student include a written explanation including precise language? **MP6** **Questions to Guide Student Thinking** • Can you explain your steps in writing and to your group members? **MP3** • Simplify each side of the equation and tell me what you get. • Substitute in multiple values for *x* and see if it yields a true statement. **Misconceptions** Students may • Incorrectly distribute, e.g., $5(2x+2)-4=10x+-2$ or $8x(2x+2)-4=10x-4$ • Incorrectly combine like terms, e.g., $6x+(2x+2)-4=10x+-4$ • Come up with a solution that only works for one value of x, e.g., $10(2x+2)-4=10x+36$ will be true if $x=2$. • Think that the same number/expression needs to go in both blanks. **Vocabulary** Distribute, Expand, Equivalent expressions, Variables, Coefficients

Created by: Illinois State Board of Education Content Area Specialist

THINK- What observations can you make about this task?

PAIR

SHARE

ACTIVITY

2:00 – 2:40

Create Math Task

- Review the **Placemat Collaborative Poster**
- In your groups, determine which algebra standard(s) you would like to develop a task for.
- Then, complete the **Math Task Planning Template Poster.**

ACTIVITY

2:40 – 3:00

Math Task Carousel

- Display your group's task.
- Examine the other group's task.
- **Use sticky notes to leave areas of strength and areas of improvement.**
- Rotate and continue until you have finished examining all posters.
- Be ready to share out any questions or "ahas."
- TAKE PHOTOS OF TASKS IF YOU WOULD LIKE!

ACTIVITY

Revise and Submit

- Make any necessary revisions.
- In your group, determine who will be responsible for **typing and e-mailing** your group's Math Task Planning Template.
- E-mail to the entire group and CC: jejohnson@ed.sc.gov by **Friday, November 22, 2013 at 5 p.m.**

Reflection

Reflect on the activities we did today….

- ✓ Identified the algebra standards at each grade level
- ✓ Vertical Alignment Worksheet
- ✓ Collaborated with grade level groups
- ✓ Observed and analyzed a problem solving lesson
- ✓ Defined the features of a good task
- ✓ Analyzed a task
- ✓ Created a tasked and revised based on feedback

How will you implement these activities into your planning or classroom practice?

3 Methods to Respond

- Go to **http://tinyurl.com/padlet111413**
- Scan the QR Code
- Write your response on a sticky note and leave it attached to this sheet.

Objectives

- **IDENTIFY** the algebra standards in a specified grade level
- **DETERMINE** the vertical alignment of a set of standards
- **OBSERVE** and analyze a lesson
- **DEFINE** the key features in a good mathematics task
- **CREATE** a task that is complete and ready to use

Resources

- Common Core Standards for Math
- CCSS-Math Wiring Graph
- Mathematics Assessment Resource Service (MARS) Task
- Illinois Department of Education
- Oregon Department of Education

Questions

Photo: microsoft.com

Contact Information

Janel Johnson

Ed. Associate - Middle School Mathematics

E-mail: jejohnson@ed.sc.gov

P: 803.734.7814 | F: 803.734.8388

Scan my QR Code!

Certificates of Attendance

Photo: microsoft.com

- Survey will be sent to you via e-mail.
- Once complete, your certificate will be sent to you via e-mail.

Upcoming Professional Development Sessions

CHECK OUR WEBSITE FOR UPCOMING SPRING AND SUMMER WORKSHOPS!!!

- Go to www.ed.sc.gov
  - Hover over **"Programs & Services"**
  - Click on **"Common Core Standards"**
  - Scroll down to **"Professional Learning Opportunities"**

E-mail mathpd@ed.sc.gov for questions and more information.

Exit Ticket

On an index card, please reflect on your day:

1. What worked well for you today?
2. What would you like to learn more about?
3. What could be improved?